Document ID: SPC-401
Revision ID: 0
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Specification

PROJECT FILE NO. 021052

Backhoe Modifications for the OU 7-10 Glovebox Excavator Method Project

1) Auto Lube System
2) Backhoe Flow Restrictions
3) Boom Cylinder Modification
4) Drum Weighing System
5) Fire Suppression
6) Hydraulic Line Replacement
7) Lock Check Valves
8) Preparation for Boot Installation and Preparation for Field Use

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho

INEEL
Idaho National Engineering and Environmental Laboratory

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DOCUMENT MANAGEMENT CONTROL SYSTEM (DMCS)
DOCUMENT APPROVAL SHEET

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REVIEW AND APPROVAL SIGNATURES
Denote R for review concurrence, A for approval, as appropriate.

8. Type or Printed Name / Signature	9. R/A	9. Date	10. Organization/ Discipline
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Specification

PROJECT FILE NO. 021052

Backhoe Modifications – Auto Lube System for the OU 7-10 Glovebox Excavator Method Project

Prepared for:
U.S. Department of Energy
Idaho Operations Office
Idaho Falls, Idaho

Idaho National Engineering and Environmental Laboratory

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FIGURES

1. SUMMARY

1.1 General

The Idaho National Engineering and Environmental Laboratory (INEEL), a Department of Energy national laboratory operated by Bechtel BWXT Idaho, LLC, will procure a Backhoe Excavation System. The Backhoe Excavation System incorporates a modified CAT 446B backhoe loader and associated end effectors. The backhoe loader will be the primary instrument used in the retrieval of radioactively contaminated waste in the Operable Unit (OU) 7-10 Glovebox Excavator Method Project.

The OU 7-10 Glovebox Excavator Method Project incorporates a Retrieval Confinement Structure (RCS) located over the excavation site. The RCS consists of a steel-framed, steel-paneled structure with Lexan windows. The RCS is located within a larger fabric-skinned Weather Enclosure Structure. Packaging Glovebox Systems are attached directly to the RCS and are fed by track-guided transfer carts.

A standard 446B backhoe performs soil excavation, probe removal, 55-gal drum removal (using a JAW bucket design), and core sampling (using a jackhammer/core sampler design). The backhoe cab and loader are located outside the RCS, while the boom, stick, and various end effectors are located inside the contaminated RCS structure.

The boom cylinders, stick cylinders, and pivot cylinders (all located within the RCS) require periodic greasing. Greasing of these cylinders must be done remotely from outside the RCS structure to ensure worker safety.

To reach the boom, stick, and pivot cylinder grease points, a combination of hard and flexible lines must be mounted along the boom and stick. These lines shall tie back to progressive metering valves. A single line leading from the metering valves to a central location penetrates the RCS wall through the backhoe boot (see Figure 1). Lubrication shall then be supplied through a fully automated system using an electric pump. The system shall be actuated by manual switch located within the backhoe cab.

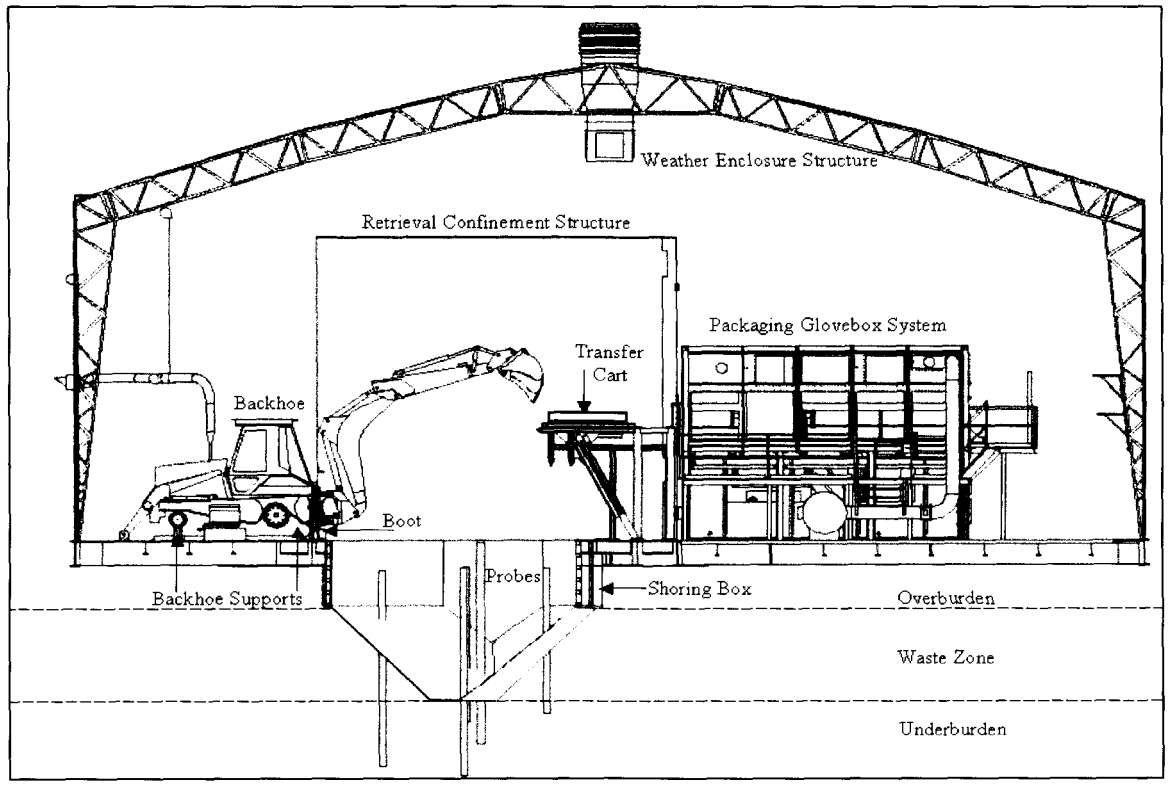

Figure 1. Cross section of the Glovebox Excavator Method Project facility.

1.2 Work Included

This specification covers the subcontractor and equipment supplier's requirements for the design, fabrication, assembly, installation, and testing for the backhoe Auto Lube System. It is not the intent of this specification to completely define all details of installation. Equipment shall be designed, fabricated, assembled, and installed in accordance with this specification and the equipment supplier's and subcontractor's standard practices when such practices do not conflict with this specification.

The Auto Lube System, and all associated hardware, shall be completely assembled and installed into the 446B backhoe at the subcontractor's facility.

The following shall be delivered to Bechtel BWXT Idaho, LLC:

1. Complete and fully integrated designs of the Auto Lube System on a 446B backhoe, as shown on Contract Drawing 519931.

2. Vendor data submittals in accordance with vendor data schedule and this specification.

1.3 Work Not Included

Equipment, unless specified herein, is not included. The following shall not be included in the subcontractor's scope of work.

- The subcontractor is not responsible for performing cylinder lubrication operations at the RCS facility.

1.4 INEEL-Furnished Materials, Equipment, and Services

The INEEL will furnish the 446B backhoe loader.

2. APPLICABLE CODES, PROCEDURES, AND REFERENCES

The following documents form a part of this specification to the extent specified herein and as applicable. Unless otherwise specified, the issue in effect on the date of invitation to bid shall apply. In case of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

2.1 National and Local Codes

Occupational Safety and Health Administration

29 CFR 1910, Occupational Safety and Health Standards

2.2 Industry Standards and DOE Orders

American Institute of Steel Construction, Manual of Steel Construction

American National Standards Institute (ANSI)/American Welding Society (AWS)

ANSI/AWS A2.4, Standard Symbols for Welding, Brazing, and Non-Destructive Examination

ANSI/AWS D1.1, Structural Welding Code Steel

ANSI/AWS D9.1, Welding Requirements for Sheet Metal

3. TECHNICAL REQUIREMENTS

3.1 General

The equipment supplier shall design the Auto Lube System to provide for a fully functional system and to perform as specified in a safe and efficient manner. This section defines the design requirements for the Auto Lube System.

3.1.1 Lubrication Frequency

The Auto Lube System shall have the capability to grease all reasonable grease fittings, located within the RCS as stated on contract drawings, manually or by electric time clock on a daily basis for a period of 90 days or as recommended by Caterpillar Corporation or the Auto Lube manufacturer.

3.2 Restrictions

None identified.

3.3 Performance Requirements

The Auto Lube System shall be capable of delivering grease to all reasonable lubrication points within the RCS as stated on contract drawings.

The Auto Lube System shall be operated by an automated programmable lubrication system.

3.4 Human Factors

The design shall use human factor engineering principles and criteria such that all equipment is easily maintainable. The design shall provide access to each system component (located outside of the RCS) for operation, cleaning, and maintenance.

3.5 Reliability/Maintainability

3.5.1 Reliability

All subcomponents of the Auto Lube System shall be of a quality that the expected mean time between failure for this system shall not be less than 1,080 hours.

The automated lubrication equipment bearings, fittings, and controls shall be sealed against moisture and damaging particle intrusion using standard industrial components, as practical.

The Auto Lube System shall employ rugged, industrial off-the-shelf equipment to the maximum extent practical.

The Auto Lube System control system's hardware and software shall be based on industry standard components that have been proven in similar systems.

Any plastics or elastomers inside the RCS shall be compatible with a high concentration of volatile carbon tetrachloride.

3.5.2 Maintainability

The Auto Lube System shall be designed and assembled to facilitate ease of inspecting, servicing, and maintaining equipment.

The Auto Lube System's standard replacement parts, shown on the manufacturer's recommendations, shall be readily available for routine maintenance activities.

3.6 Environmental Regulatory Requirements and/or Site and Operating Requirements

The Auto Lube System shall be capable of remotely delivering grease to all reasonable lubrication points within the RCS through implementation of an automated programmable lubrication device.

4. ENVIRONMENTAL, SAFETY, AND HEALTH REQUIREMENTS

4.1 Subcontractor Safety

The subcontractor shall work in accordance with applicable Occupational Safety and Health Administration requirements, as stated in 29 CFR 1910.

4.2 Personal Protective Equipment

The subcontractor shall determine and require use of appropriate personal protective equipment for all tasks performed.

4.3 Emergency Response

Not applicable.

4.4 Accident Investigation

Not applicable.

5. MANUFACTURING AND ASSEMBLY

5.1 General

The Auto Lube System shall be assembled and installed onto a 446B backhoe, in the subcontractor's shop as shown on Contract Drawing 519931, to ensure proper fits and operation. The contractor's technical representative or alternate will inspect the assembled final product. Assembly of the equipment shall be made in a clean, dust-free area of the subcontractor's facility.

5.2 Prohibitions

None identified.

5.3 Material

Materials used shall be free from defects that would adversely affect the performance or maintainability of individual components or the overall assembly. Materials used within the RCS structure shall be compatible with volatile carbon tetrachloride. Materials not specified herein shall be of the same quality used for the intended purpose in the equipment manufacturer's standard commercial practice.

5.4 Cleaning, Painting, and Coating

All automated lubrication equipment shall be thoroughly cleaned. All scale, oxides, lubricants, chips, and other foreign matter shall be removed. All burrs, castings scars, and sharp edges shall be ground smooth.

5.5 Spare Parts

Cross reference the applicable standard quality requirements identified in the procurement package.

6. SUBMITTALS

As a minimum, the subcontractor shall provide the contractor with the submittals referenced in this section. The subcontractor shall be responsible for all submittals that come from the equipment supplier. Additional submittal requirements are defined in the vendor data schedule and applicable contract documents. The quantities and submittal schedule are included in the attached vendor data schedule.

6.1 General Submittal Requirements

6.1.1 General Procedures

Vendor data, whether prepared by the subcontractor or the subcontractor's subtier or supplier, shall be submitted as instruments of the subcontractor. Therefore, prior to submittal, the subcontractor shall ascertain that material and equipment covered by the submittal and the contents of the submittal itself meet all the requirements of the subcontract specifications.

Each submittal shall contain identification for each separable and separate piece of material or equipment, and literature with respect to the information provided in the specification and on the vendor data schedule. Submittals shall be numbered consecutively for each different submittal.

6.1.2 Vendor Data Schedule

Vendor data required by the specification sections are identified on the vendor data schedule. The vendor data schedule provides a tabular listing by item number, specification reference, and description of the item or service. The type of submittal is identified by a "Vendor Data Code," and the time required to submit the item is identified by a "When to Submit" code. An "Approval" code specifies whether the submittal is for mandatory approval or for information only. One copy of routine paper or electronic file submittals is required; the Vendor Data Schedule may require additional copies. Electronic file submittals are preferred.

6.1.3 Vendor Data Transmittal and Disposition Form 431.13

All vendor data shall be submitted to the contractor using the Vendor Data Transmittal and Disposition Form. The form provides the subcontractor a method to submit vendor data and provides the contractor a means of dispositioning the submittal. The subcontractor

shall list the vendor data schedule item number, a vendor data transmittal tracking number (if applicable), specification number reference, a tag number (if applicable), the submittal status (e.g., mandatory approval, information only, or re-submittal), the revision level, and the item description. The description should be complete enough that a person unfamiliar with the project can determine what is included in the submittal.

6.1.4 Disposition by the Contractor

The contractor's comments and required action by the subcontractor will be indicated by a disposition code on the submittal. The disposition codes will be classed as follows:

A. **Work May Proceed:** Submittals so noted will generally be classed as data that appear to be satisfactory without corrections.

B. **Work May Proceed with Comments Incorporated. Revise Affected Sections and Resubmit Entire Submittal:** This category will cover data that, with the correction of comments noted or marked on the submittal, appear to be satisfactory and require no further review by the contractor prior to construction.

C. **Work May NOT Proceed. Revise and Resubmit:** Submittals so dispositioned will require a corrected re-submittal for one of the following reasons:

(1) Submittal requires corrections, shown on comments, prior to final review.

(2) Submittal data are incomplete and require more detailed information prior to the final review.

(3) Submittal data do not meet subcontract document requirements.

D. **Accepted for Use. Information Only Submittal:** Submittals so dispositioned will generally be classified as information only for as-specified material and equipment.

Mandatory Approval-coded vendor data will be reviewed by the contractor and receive an A, B, or C disposition. Information only submittals without comments will receive a D disposition. The A, B, and C-coded dispositioned submittals will be returned to the subcontractor.

The D-dispositioned submittals will not be returned to the subcontractor. The contractor may provide internal review of information only submittals. In the event that comments are generated on an information only submittal, the submittal may be dispositioned B or C and returned to the subcontractor for appropriate action. Acknowledgment of receipt of dispositioned vendor data by the subcontractor will not be required.

The contractor will return dispositioned submittals with reasonable promptness. The subcontractor shall note that a prompt review is dependent on timely and complete submittals in strict accordance with these instructions.

6.2 Spare Parts and Special Tools List

The subcontractor shall submit to the contractor a list of recommended spare parts and any special tools required for operation and maintenance of the Auto Lube System. This list shall include all corresponding suppliers of each component and their phone numbers.

6.3 Operations and Maintenance Manuals

The Operations and Maintenance Manual shall cover the installation, operation, and maintenance of the equipment in detail. All drawings, diagrams, and record forms required for installation shall be included and incorporated in the manual.

6.4 Drawings

The equipment supplier shall submit prints of the final drawings disclosing the configuration of the automated lubrication device. These drawings shall document the mechanical, electrical, and instrumentation configuration. The drawings shall be of sufficient detail to allow the contractor to identify and evaluate the systems and components for installation, operation, maintenance, and repair activities without detailed physical inspection of the actual hardware.

6.5 Software

Not applicable.

6.6 Inspection Test Plans/Procedures/Reports

This includes the following:

- **Performance Test Procedures (Subcontractor Preshipment):** Performance test plans, procedures, and reports as outlined in Section 7.4.1 of this specification.

- **Performance Test Reports (Subcontractor Preshipment):** Performance test results and reports as outlined in Section 7.4.2 of this specification.

7. QUALITY ASSURANCE

7.1 Minimum Qualifications of Manufacturer, Supplier, or Personnel

The equipment shall be assembled and installed by a manufacturer's representative that has prior related experience pertaining to the installation of an automated lubrication system for greasing all appropriate points along the 446 B backhoe boom and stick.

7.2 Quality Assurance Program

The manufacturer is responsible for providing materials and workmanship that meet the codes and standards identified in this specification.

7.3 Nondestructive Examination

Not applicable.

7.4 Operational Testing

7.4.1 Performance Test Procedures (Subcontractor Preshipment)

The equipment supplier or subcontractor shall submit to the contractor an "in-shop" testing plan and procedure prior to demonstration of the Auto Lube System's capabilities at the equipment supplier's or subcontractor's facility. The plan and procedure shall include the date, test conditions, duration of testing, testing sequence, materials used, and methods of performing the tests.

The subcontractor shall inform the contractor 1 week in advance of performance testing so a contractor representative may be present during the testing process.

Factory testing should demonstrate that all equipment operates and interfaces together into a functional automated lubrication system, as defined within this specification.

Testing acceptance criteria:

- Test all lubrication points to ensure that ample lubrication of each point has been achieved.
- Test all lubrication points to ensure that the lines leading up to each point will not become plugged during operation.

7.4.2 Performance Test Report (Subcontractor Preshipment)

The equipment supplier or subcontractor shall submit to the contractor the "in-shop" testing results following the demonstration of the automated lubrication device's capabilities at the equipment supplier's or subcontractor's facility.

7.5 Special Processes

Not applicable.

8. PACKAGING AND SHIPPING

8.1 Packing and Packaging

Not applicable.

8.2 Marking and Handling

Not applicable.

8.3 Special Transportation Requirements

Not applicable.

9. INSTALLATION AND MAINTENANCE

9.1 Installation

The Auto Lube System shall be installed into the 446B backhoe, used for the OU 7-10 Glovebox Excavator Method Project, at the subcontractor's facility.

9.2 Startup and Calibration

The supplier or subcontractor shall calibrate the Auto Lube System to ensure accurate injection volume of lubrication at the various points along the boom, stick, and pivot cylinders.

9.3 Training

NOTE: *It is anticipated that the Auto Lube System will be simple enough that formal training above the instructions provided with the tool will not be required.*

The subcontractor shall provide any required training (above the instructions provided for the Auto Lube System) to an INEEL representative who will then provide training to other INEEL personnel.

9.4 Maintenance

The Auto Lube System manufacturers shall provide recommended maintenance instructions for the automated lubrication device and all associated equipment.

10. MARKING AND IDENTIFICATION

Not applicable.

11. ACCEPTANCE

11.1 Final Acceptance Method

Successful performance of the test results and submittal of all documents listed on the vendor data schedule will constitute acceptance.

11.2 Inspection and Hold Points

Unless otherwise specified by the purchase order, the supplier shall notify the contractor at least 5 working days in advance of the time that the Auto Lube System will be available for source inspection by the contractor representative. Work cannot proceed without written authorization from the contractor after hold point inspection.

11.3 INEEL Surveillance and Audits

An authorized contractor representative may perform service inspection or surveillance.

12. ATTACHMENTS

Vendor Data Schedule- Form 431.14

Contractor Drawing 519931

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Specification Environmental Restoration	**BACKHOE MODIFICATIONS – AUTO LUBE SYSTEM FOR THE OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT**	Identifier: SPC-401 Revision: 0 Page: **A1** of A2

ATTACHMENT A

431.14
08/01/2001
Rev. 03

Vendor Data Schedule

Project Title OU 7-10 GLOVEBOX EXCAVATOR METHOD PROJECT - BACKHOE MODIFICAITON - AUTO LUBE SYSTEM **Project No.** 021052 - 21962

System Engineer/ Project Manager LOPEZ DARYL A **Date:** 12-APR-02 **Rev:** 0

Vendor Data Coordinator Address STURM BETH L, WCB-3WH502, MS: 3535

Vendor Data Codes				
A. As-Built Drawings B. Assembly Drawings C. Attendance Record D. Blasting Plan E. Catalog Data F. Chem & Physical Analysis G. Concrete Mix Design H. Control System Diagram I. Design Calculations J. Installation Instructions	K. Manufacturers Data Report L. O&M Manual M. Parts List N. Piping Drawing O. Procedure/Instructions P. Pump Head Curves Q. Personnel Qualifications R. Red_line Drawings S. RSMI & Maintenance Log T. Sample(Color, Texture, etc.)	U. Shop Drawings V. Survey Records W. Test Procedure X. Special Processes Y. Operational/CC Testing Z. Test Reports AA. UL/FM Listing AB. Warranty/Guarantee AC. Weld Records AD. Wiring Diagrams	AE. MSDS AF. Hardware Schedule AG. Specification AH. Manufacturing/Inspection/Test Plan AI. Test Certification AJ. Recommended Spares AK. Special Tools List AL. Certificate of Conformance AM. Certificate of Disposal or Destruction AN. Design Verification	AO. Design Qualification Testing AP. Traceability Procedure AQ. Cleaning Procedure AR. Weld Procedure Qualificaiton AS. Welder Performance Personnel Qualifications AT. Non-Destructive Examination Personnel Certifications AU. Inspector Certifications AV. Limited Shelf Life/Operational Data AW. Special Packaging, Shipping, and Rigging Procedure AX. Certificate of Materials to ASME Code AY. Chemical Inventory AZ. Other
When to Submit				
AC - As Completed AT - After Test BC - Before Contract Awarded	BFA - Before Final Acceptance BFR - Before Fabrication Release ROS - Removed Off-Site PDS - Prior to Delivery on site	PTP - Prior to Purchase PS - Prior to Shipment PT - Prior to Test	PTC - Prior to Construction Start PTI - Prior to Installation PTW - Prior to Welding	TS - Time of Shipment WP - With Proposal

ATTACHMENT A

Item No.	Clause/Article or Drawing/Specification Reference	Description	Vendor Data Code	Extra Copies Required	When to Submit	Approval Code
	7.4.1		W. Test Procedure	4	PT - Prior to Test	Approval Required
	7.4.2		Z. Test Reports	4	AT - After Test	Approval Required
	6.2		AK. Special Tools List	4	PS - Prior to Shipment	Information Only
	6.3		L. O&M Manual	4	PS - Prior to Shipment	Information Only
	6.4		B. Assembly Drawings	4	BFR - Before Fabrication Release	Approval Required
	6.2		AJ. Recommended Spares	4	PS - Prior to Shipment	Information Only

Instructions:
1. Refer to subcontract documents for instructions on submittals.
2. Electronic submittals in lieu of paper documents are acceptable and encouraged.
3. The normal number of copies required is ONE. If more are required, the number will be shown here.
4. THE INEEL WILL SCAN ALL SUBMITTED VENDOR DATA INTO A SYSTEM THAT IS ACCESSIBLE TO ALL INEEL EMPLOYEES UNLESS THE SUPPLIER/SUBCONTRACTOR IDENTIFIES SUBMITTED INFORMATION AS PROPRIETARY.